

What is claimed is:

1. A substrate polishing apparatus comprising:
  - a rotatable table having a polishing pad for  
5 polishing a semiconductor substrate;
  - a light emission and reception device for  
emitting measurement light through a through hole formed in  
said polishing pad to said semiconductor substrate and  
receiving reflected light from said semiconductor substrate  
10 so as to measure a film on said semiconductor substrate; and
  - a supply passage for supplying a fluid to a path  
of said measurement light;wherein said supply passage has an outlet portion  
positioned in said through hole.  
15
2. A substrate polishing apparatus according to  
claim 1, wherein said outlet portion is detachably mounted  
on said rotatable table.
- 20 3. A substrate polishing apparatus comprising:
  - a rotatable table having a polishing pad for  
polishing a semiconductor substrate;
  - a light emission and reception device for  
emitting measurement light through a through hole formed in  
25 said polishing pad to said semiconductor substrate and  
receiving reflected light from said semiconductor substrate  
so as to measure a film on said semiconductor substrate; and
  - a supply passage for supplying a fluid to a path

of said measurement light;

wherein said supply passage has an outlet portion detachably mounted on said rotatable table.

5                   4. A substrate polishing apparatus comprising:

a rotatable table having a polishing pad for polishing a semiconductor substrate;

10                   a light emission and reception device for emitting measurement light through a through hole formed in said polishing pad to said semiconductor substrate and receiving reflected light from said semiconductor substrate so as to measure a film on said semiconductor substrate;

a supply passage for supplying a fluid to a path of said measurement light; and

15                   an outlet portion moving means for moving an outlet portion of said supply passage along a direction in which said through hole extends.

20                   5. A substrate polishing apparatus comprising:

a rotatable table having a polishing pad for polishing a semiconductor substrate;

25                   a light emission and reception device for emitting measurement light through a through hole formed in said polishing pad to said semiconductor substrate and receiving reflected light from said semiconductor substrate so as to measure a film on said semiconductor substrate; and

a supply passage for supplying a fluid to a path of said measurement light;

wherein said supply passage has a nonreflective inner surface.

6. A substrate polishing apparatus comprising:

5 a rotatable table having a polishing pad for polishing a semiconductor substrate;

a light emission and reception device for emitting measurement light through a through hole formed in said polishing pad to said semiconductor substrate and  
10 receiving reflected light from said semiconductor substrate so as to measure a film on said semiconductor substrate;

a supply passage for supplying a fluid to a path of said measurement light; and

a protection cover detachably mounted on said  
15 rotatable table when said polishing pad is replaced;

wherein said protection cover is received in a through hole formed in said polishing pad and covers an opening which constitutes said supply passage formed in said rotatable table.

20

7. A substrate polishing apparatus comprising:

a rotatable table having a polishing pad for polishing a semiconductor substrate;

a light emission and reception device for  
25 emitting measurement light through a through hole formed in said polishing pad to said semiconductor substrate and receiving reflected light from said semiconductor substrate so as to measure a film on said semiconductor substrate;

a supply passage for supplying a fluid to a path of said measurement light; and

an auxiliary supply passage for supplying a fluid positioned at the forward of said supply passage in a  
5 rotating direction of said rotatable table.

8. A substrate polishing apparatus comprising:

a rotatable table having a polishing pad for polishing a semiconductor substrate;

10 a light emission and reception device for emitting measurement light through a through hole formed in said polishing pad to said semiconductor substrate and receiving reflected light from said semiconductor substrate so as to measure a film on said semiconductor substrate;

15 a supply passage for supplying a fluid to a path of said measurement light; and

a polishing pad piece fitted in an opening formed in said polishing pad, said through hole being formed in said polishing pad piece;

20 wherein said polishing pad piece has a pad piece surface continuously connected to a surface of said polishing pad, and said pad piece surface is flat.

9. A substrate polishing apparatus comprising:

25 a rotatable table having a polishing pad for polishing a semiconductor substrate;

a light emission and reception device for emitting measurement light through a through hole formed in

said polishing pad to said semiconductor substrate and receiving reflected light from said semiconductor substrate so as to measure a film on said semiconductor substrate; and  
a supply passage for supplying a fluid to a path  
5 of said measurement light;

wherein said through hole has a water repellent inner surface.

10 10. A substrate polishing apparatus comprising:  
a polishing table against which a substrate is pressed;

a substrate measuring device disposed in said polishing table for detecting a film thickness or a polishing end point of said substrate; and

15 an expendable component replacement door which is openably and closably disposed on said polishing table for allowing an expendable component to be taken into and out of said polishing table.

20 11. A substrate polishing apparatus according to claim 10, wherein said substrate measuring device applies measurement light to said substrate and measures a film on said substrate based on reflected light from said substrate.

25 12. A substrate polishing apparatus according to claim 10, wherein said expendable component comprises a light source component for emitting said measurement light.

13. A substrate polishing apparatus according to claim 11, wherein said expendable component comprises a control valve disposed in a passage for a fluid which is used in a measurement process using said measurement light.

5

14. A substrate polishing apparatus according to claim 11, wherein said expendable component replacement door is disposed on a side surface of said polishing table.

10

15. A substrate polishing apparatus according to claim 11, wherein said expendable component replacement door is disposed on a surface of said polishing table against which said substrate is pressed, and is deviated from an orbit of said substrate.

15

16. A substrate polishing apparatus comprising:  
a polishing table against which a substrate is pressed;

20 a substrate measuring device disposed in said polishing table for detecting a film thickness or a polishing end point of said substrate;

25 a plurality of expendable components having the same function, said plurality of expendable components being mounted on said polishing table and constituting said substrate measuring device; and

an expendable component switching means for switching expendable component, of said plurality of expendable components, which functions to measure a film on

said substrate.

17. A substrate polishing apparatus according to claim 16, wherein said substrate measuring device applies measurement light to said substrate and measures a film on said substrate based on reflected light from said substrate.

18. A substrate polishing apparatus according to claim 17, wherein said expendable component switching means automatically switches the expendable components based on a usage situation of each of said expendable components which function to measure the film on said substrate.

19. A substrate polishing apparatus comprising:  
a polishing table against which a substrate is pressed;

a substrate measuring device disposed in said polishing table for detecting a film thickness or a polishing end point of said substrate; and

an expendable component constituting said substrate measuring device and disposed outside of said polishing table.

20. A substrate polishing apparatus according to claim 19, wherein said substrate measuring device applies measurement light to said substrate and measures a film on said substrate based on reflected light from said substrate.

21. A substrate polishing apparatus according to claim 20, wherein said expendable component comprises a light source component for emitting said measurement light.

5           22. A substrate polishing apparatus according to claim 21, further comprising:

          a fixed-side light guide disposed outside of said polishing table for transmitting said measurement light emitted by said light source component to said polishing  
10   table; and

          a rotary-side light guide disposed in said polishing table for receiving said measurement light from said fixed-side light guide.

15           23. A substrate polishing apparatus according to claim 22, wherein said fixed-side light guide and said rotary-side light guide have a fixed-side light guide end portion and a rotary-side light guide end portion, respectively, which face each other when said polishing  
20   table is in a predetermined light guiding region extending in a rotating direction of said polishing table.

          24. A substrate polishing apparatus according to claim 20, wherein said expendable component comprises a  
25   control valve disposed in a passage for a fluid which is used in a measurement process using said measurement light.

          25. A substrate polishing apparatus according to



claim 24, further comprising:

a fixed-side passage disposed outside of said polishing table, said control valve being disposed in said fixed-side passage; and

5 a rotary-side passage disposed in said polishing table;

wherein said fixed-side passage and said rotary-side passage have a fixed-side passage end portion and a rotary-side passage end portion, respectively, which face each other when said polishing table is in a predetermined conduction region extending in a rotating direction of said polishing table.

26. A substrate polishing apparatus according to  
15 claim 25, further comprising:

an orifice forming member having an orifice forming surface disposed closely to said polishing table with an orifice gap formed therebetween, said orifice forming surface being disposed at a position corresponding  
20 to a position of said rotary-side passage end portion and being disposed in a region where said fixed-side passage end portion is not provided.

27. A substrate polishing apparatus comprising:  
25 a polishing table against which a substrate is pressed;

a light emission and reception device for emitting measurement light from said polishing table to said

substrate, and receiving reflected light from said substrate so as to measure a film on said substrate; and

5 a fluid supply device for supplying a measurement fluid, which transmits said measurement light and said reflected light, to an area where said measurement light is applied;

wherein said fluid supply device supplies a solvent used in a polishing slurry as said measurement fluid.

10 28. A substrate polishing apparatus according to claim 27, wherein said solvent comprises an alkaline solvent of a silica slurry.

15 29. A substrate polishing apparatus according to claim 27, wherein said solvent comprises a surface-active agent solution of a ceria slurry.

20 30. A substrate measuring device for measuring a film on a substrate incorporated in a substrate polishing apparatus having a polishing table against which a substrate is pressed, said substrate measuring device characterized in that:

25 said polishing table has a fluid supply device for supplying a measurement fluid, and said fluid supply device supplies a solvent used in a polishing slurry as said measurement fluid.

31. A substrate polishing apparatus comprising:

a polishing table against which a substrate is pressed;

5 a light emission and reception device for emitting measurement light from said polishing table to said substrate and receiving reflected light from said substrate so as to measure a film on said substrate; and

10 a fluid supply device for supplying a measurement fluid, which transmits said measurement light and said reflected light, to an area where said measurement light is applied;

wherein said fluid supply device supplies a highly viscous fluid as said measurement fluid, and said highly viscous fluid is more viscous than a polishing slurry.

15 32. A substrate measuring device incorporated in a substrate polishing apparatus having a polishing table against which a substrate is pressed for emitting measurement light from said polishing table to said substrate and receiving reflected light from said substrate  
20 so as to measure a film on said substrate, said substrate measuring device comprising:

25 a fluid supply device for supplying a measurement fluid, which transmits said measurement light and said reflected light, to an area where said measurement light is applied;

wherein said fluid supply device supplies a highly viscous fluid as said measurement fluid, and said highly viscous fluid is more viscous than a polishing slurry.

33. A substrate polishing apparatus comprising:  
a polishing table against which a substrate is  
pressed;

5           a light emission and reception device for  
emitting measurement light from said polishing table to said  
substrate and receiving reflected light from said substrate  
so as to measure a film on said substrate; and

10           a fluid supply device for supplying a measurement  
fluid, which transmits said measurement light and said  
reflected light, to an area where said measurement light is  
applied;

          wherein said fluid supply device supplies a gas  
as said measurement fluid.